

Remarks:

Reconsideration of the application is requested.

Claims 1-6 and 16-25 remain in the application. Claim 18 has been amended.

In item 3 on page 2 of the above-identified Office action, claim 18 has been rejected as being indefinite under 35 U.S.C. § 112, second paragraph. More specifically, the Examiner has stated that in claim 18 the limitation "wherein the introducing step defines an implantation maximum for the passivating substance X in the vicinity of the interface ... lacks clarity in its scope and meaning". The Examiner's comments have been noted and claim 18 has been appropriately amended.

Support for these changes may be found on page 13, lines 18-20, ("conditions which cause the implantation maximum 8 to lie a short way underneath the interface 7 are chosen in the implantation step") of the specification of the instant application.

It is accordingly believed that the claims meet the requirements of 35 U.S.C. § 112, second paragraph. Should the Examiner find any further objectionable items, Counsel would

appreciate a telephone call during which the matter may be resolved. The above-noted changes to claim 18 are provided solely for the purpose of satisfying formal requirements or are made solely for cosmetic reasons to clarify the claim. The changes are neither provided for overcoming the prior art nor do they narrow the scope of the claim for any reason related to the statutory requirements for a patent.

In item 5 on page 3 of the Office action, claims 16-21 and 23-25 have been rejected as being obvious over *Hsu* (US 5,468,657) in view of *Sato et al.* (US 6,121,117) under 35 U.S.C. § 103.

In item 6 on page 6 of the Office action, claim 22 has been held allowable, if rewritten or amended to include all of the limitations of the base claim and any intervening claims.

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 16 calls for, *inter alia*:

fabricating a semiconductor structure having a base layer, an insulation layer, a monocrystalline silicon layer, and an interface between the insulation layer and the monocrystalline silicon layer;

placing a passivating substance X **into** the monocrystalline silicon layer, during or after the fabrication of the semiconductor structure; and

heat-treating the semiconductor structure with the passivating substance X for causing the passivating substance X in the monocrystalline silicon layer to diffuse both to the interface and to a surface of the monocrystalline silicon layer opposite to the interface.

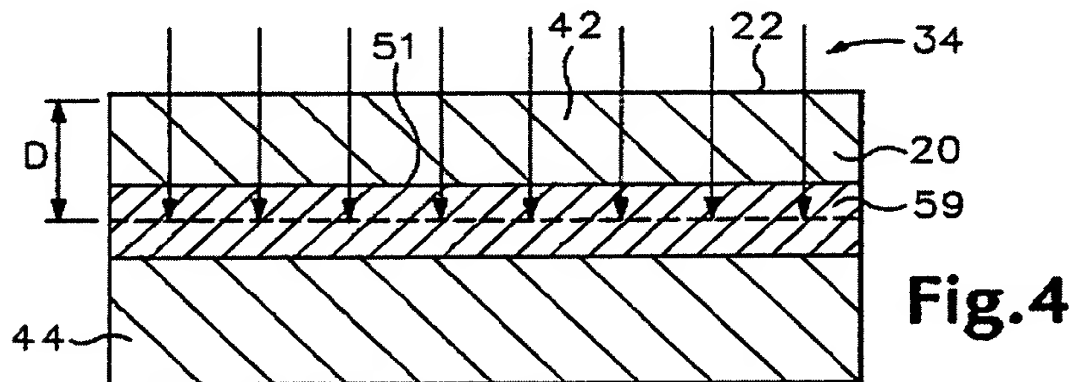
In the *Response to Arguments* in item 8 on pages 6-7, the Examiner stated

As shown Fig. 4, as applicants correctly pointed out, Hsu et al. discloses an SOI substrate comprises the first layer (44) of monocrystalline silicon the second layer (59) of silicon oxide formed directly on the first layer and the third layer (42) of monocrystalline silicon. As figure 4 shows, the third layer (20) of the monocrystalline silicon layer is implanted with a nitrogen ion ("passivating substance") and the nitrogen penetrates through the third layer of monocrystalline silicon (20) and goes deep into the second layer of silicon oxide (59). Therefore, Examiner respectfully submits that Hsu et al. disclose introducing of "passivating substance", i.e., nitrogen ion, into a monocrystalline silicon layer. And applicants' argument has no merit given clear discloser of Fig. 4.

Previous similar arguments by the Examiner have been considered and, consequently, claim 16 had been amended in the last response to recite "**placing** a passivating substance X

into the monocrystalline silicon layer," instead of "**introducing** a passivating substance X into the monocrystalline silicon layer". Placing a passivating substance X into the monocrystalline silicon layer means that the passivating substance X is located in the monocrystalline silicon layer.

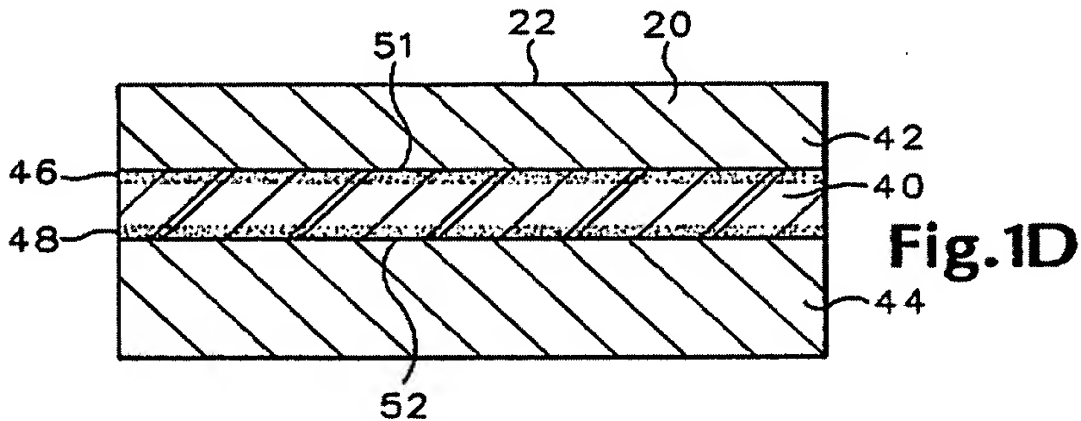
Fig. 4 of *Hsu*, re-produced below, shows, as described in col. 7, lines 35-38, "a wafer 20 with an upper layer 42 of monocrystalline silicon, a middle layer 59 of nitrogen-implanted silicon dioxide, and a lower monocrystalline silicon 44."



It is clear from Fig. 4 and from the specification of *Hsu* that in *Hsu* the nitrogen is placed into the **silicon dioxide layer** 59 which is an insulator (col. 1, lines 35-36) and **not** into the monocrystalline silicon layer 42 or monocrystalline silicon layer 44. In contrast, in the invention of the

instant application as recited in claim 16, a passivating substance is placed into the *monocrystalline silicon layer*.

Furthermore, as can be clearly seen in Fig. 1D (similarly Fig. 3), re-produced below, the nitrogen diffuses within the *silicon oxide layer* 40 to the edges of the silicon oxide layer 40. In contrast, in the invention of the instant application the passivating substance diffuses within the *monocrystalline silicon layer*.



The inventive concept of the present invention is based on the underlying realization that after introducing and placing a passivating substance X into the monocrystalline silicon layer, heat-treating the semiconductor structure, removing the screen oxide layer, and subsequent growth of a gate oxide layer on the monocrystalline silicon layer, the monocrystalline silicon layer still contains sufficient passivating substance X to increase the resistance of the gate oxide layer to damage caused by hot charge carriers. There is

no disclosure or suggestion in either *Hsu* or *Sato et al.* to introduce and place a passivating substance into a monocrystalline silicon layer. Furthermore, neither *Hsu* nor *Sato et al.* contain teachings that would suggest the underlying realization on which the present invention is based. Therefore, the invention as recited in claim 16 of the instant application is believed not to be obvious over *Hsu* in view of *Sato et al.*.

It is accordingly believed to be clear that *Hsu* in view of *Sato et al.* do not suggest the features of claim 16. Claim 16 is, therefore, believed to be patentable over the art and since claims 17-25 are ultimately dependent on claim 16, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 16-25 are solicited.

If an extension of time is required, petition for extension is herewith made.

Please charge any fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,



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Version with markings to show changes made:

Claim 18 (amended). The method according to claim 17, wherein the introducing step is performed such that there is [defines] an implantation maximum for the passivating substance X in the vicinity of the interface.